

CLAIMS

1. A color changing panel light, comprising:
 - a group of LEDs for providing mixed light output controlled by at least one controller;
 - 5 and
 - a diffusing panel that is illuminated by the mixed light output, wherein the at least one controller controls the group of LEDs to cause the diffusing panel to display sequential washes of different colors.
- 10 2. The panel light of claim 1, wherein the group of LEDs is arranged in a plurality of modules, each module including at least one LED adapted to output at least first radiation having a first spectrum and second radiation having a second spectrum different than the first spectrum.
- 15 3. The panel light of claim 2, wherein the at least one LED includes at least one first LED adapted to output the first radiation and at least one second LED adapted to output the second radiation.
4. The panel light of claim 2, wherein:
 - 20 the at least one controller includes a plurality of processors; and
 - each module of the plurality of modules includes at least one processor of the plurality of processors, the at least one processor configured to independently control at least a first intensity of the first radiation and a second intensity of second radiation generated by the one module with which the at least one processor is associated.
- 25 5. The panel light of claim 4, wherein the at least one processor is configured to implement a pulse width modulation (PWM) technique to control the first intensity of the first radiation and the second intensity of second radiation generated by the one module with which the at least one processor is associated.

6. The panel light of claim 4, wherein the at least one processor is configured as a uniquely addressable processor capable of receiving at least one control signal including lighting information representing the first intensity of the first radiation and the second intensity of second radiation generated by the one module with which the at least one processor is associated.

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7. The panel light of claim 6, wherein the at least one control signal includes address information and lighting information for the plurality of modules, wherein the lighting information represents intensity values for the first radiation and the second radiation generated by each module of the plurality of modules, and wherein the at least one processor is configured to process the at least one control signal based on the address information in the at least one control signal to recover from the lighting information intensity values for the first radiation and the second radiation generated by the one module with which the at least one processor is associated.

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8. The panel light of claim 7, wherein each processor of the plurality of processors is configured as a uniquely addressable processor.

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9. The panel light of claim 8, wherein the plurality of processors are configured to be responsive to the at least one control signal so as to generate the sequential washes of different colors from the panel light.

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10. The panel light of claim 9, wherein the plurality of processors are configured to be responsive to the at least one control signal so as to generate at least one time-varying variable color lighting effect from the panel light that does not include any alphanumeric characters.

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11. The panel light of claim 10, wherein the plurality of processors are configured to be responsive to the at least one control signal so as to generate at least one time-varying variable color lighting effect from the panel light that does not include any video images.

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12. The panel light of claim 11, wherein the plurality of processors are configured to be responsive to the at least one control signal so as to generate at least one time-varying variable color lighting effect from the apparatus that does not include any alphanumeric characters or video images.

13. A geometric panel lighting apparatus, comprising:
a plurality of LEDs adapted to output at least first radiation having a first spectrum and second radiation having a second spectrum different than the first spectrum;

10 at least one geometric panel disposed with respect to the plurality of LEDs so as to at least partially diffuse the first radiation and the second radiation to provide a mixed spectrum when both the first radiation and the second radiation are generated; and

15 at least one controller coupled to the plurality of LEDs and configured to independently control at least a first intensity of the first radiation and a second intensity of the second radiation at a plurality of graduated intensities from a minimum intensity to a maximum intensity.

14. The apparatus of claim 13, wherein the plurality of LEDs includes:

20 a first plurality of LEDs adapted to output at least the first radiation having the first spectrum; and

a second plurality of LEDs adapted to output at least the second radiation having the second spectrum.

15. The apparatus of claim 13, wherein the plurality of LEDs includes at least one LED adapted to output at least the first radiation having the first spectrum and the second radiation having the second spectrum.

16. The apparatus of claim 13, wherein the at least one controller is configured to independently control at least the first intensity of the first radiation and the second intensity 30 of the second radiation so as to generate at least one time-varying lighting effect.

17. The apparatus of claim 16, wherein the at least one controller is configured to independently control at least the first intensity of the first radiation and the second intensity of the second radiation so as to generate at least one time-varying variable color lighting effect.

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18. The apparatus of claim 17, wherein the at least one controller is configured to independently control at least the first intensity of the first radiation and the second intensity of the second radiation so as to generate sequential washes of different colors.

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19. The apparatus of claim 17, wherein the at least one controller is configured to independently control at least the first intensity of the first radiation and the second intensity of the second radiation so as to generate at least one time-varying variable color lighting effect that does not include any alphanumeric characters.

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20. The apparatus of claim 17, wherein the at least one controller is configured to independently control at least the first intensity of the first radiation and the second intensity of the second radiation so as to generate at least one time-varying variable color lighting effect that does not include any video images.

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21. The apparatus of claim 17, wherein the at least one controller is configured to independently control at least the first intensity of the first radiation and the second intensity of the second radiation so as to generate at least one time-varying variable color lighting effect that does not include any alphanumeric characters or video images.

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22. The apparatus of claim 13, wherein:

the plurality of LEDs is adapted to output third radiation having a third spectrum different than the first spectrum and the second spectrum; and

30 the at least one controller is further adapted to independently control a third intensity of the third radiation.

23. The apparatus of claim 22, wherein the plurality of LEDs includes a third plurality of LEDs adapted to output at least the third radiation having the third spectrum.

5 24. The apparatus of claim 22, wherein the plurality of LEDs includes at least one LED adapted to output at least the first radiation having the first spectrum, the second radiation having the second spectrum, and the third radiation having the third spectrum.

10 25. The apparatus of claim 13, wherein the at least one controller is configured to independently control at least the first intensity of the first radiation and the second intensity of the second radiation in response to user operation of at least one user interface.

15 26. The apparatus of claim 13, wherein the at least one controller is configured to implement a pulse width modulation (PWM) technique to control at least the first intensity of the first radiation and the second intensity of the second radiation.

20 27. The apparatus of claim 13, wherein the at least one controller is configured as an addressable controller capable of receiving at least one control signal including address information and lighting information.

25 28. The apparatus of claim 27, wherein the at least one control signal includes address information and lighting information for a plurality of geometric panel lighting apparatus, wherein the lighting information includes intensity values for LEDs of the plurality of lighting apparatus, and wherein the addressable controller is configured to process the at least one control signal based on an address of the addressable controller and the address information in the at least one control signal to recover from the lighting information intensity values for the plurality of LEDs of the lighting apparatus.

29. The apparatus of claim 27, wherein the at least one control signal is formatted using a DMX protocol, and wherein the addressable controller is configured to control the plurality of LEDs based at least in part on the DMX protocol.

5 30. The apparatus of claim 13, wherein the apparatus is configured as an architectural lighting panel.

31. The apparatus of claim 30, wherein the apparatus is configured to form at least a portion of an interior or exterior architectural surface.

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32. The apparatus of claim 30, wherein the apparatus is configured as at least one of a wall panel, a floor panel, and a ceiling panel.

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33. The apparatus of claim 30, in combination with at least one other geometric panel lighting apparatus according to claim 13 to form an architectural lighting panel system.

34. A building including the architectural lighting panel of claim 30, the building comprising a surface, wherein the architectural lighting panel is mounted on the surface.

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35. The building of claim 34, wherein the surface comprises an outer surface of the building, and wherein the architectural lighting panel is mounted on the outer surface of the building.

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36. The building of claim 35, wherein the architectural lighting panel is arranged on the outer surface of the building so as to attract the attention of an observer when at least one of the first radiation and the second radiation is generated.

37. An interior space including the architectural lighting panel of claim 30, wherein the architectural lighting panel is arranged so as to illuminate the interior space.

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38. The interior space of claim 37, wherein the interior space includes at least one of a hallway, a ceiling, a floor, a wall, a door, and a display.

39. The apparatus of claim 13, wherein the plurality of LEDs is arranged in a plurality of modules, each module including at least one LED adapted to output at least the first radiation and the second radiation.

40. The apparatus of claim 39, wherein the at least one LED includes at least one first LED adapted to output the first radiation and at least one second LED adapted to output the second radiation.

41. The apparatus of claim 39, wherein:

the at least one controller includes a plurality of processors; and

each module of the plurality of modules includes at least one processor of the plurality of processors, the at least one processor configured to independently control at least a first intensity of the first radiation and a second intensity of second radiation generated by the one module with which the at least one processor is associated.

42. The apparatus of claim 41, wherein the at least one processor is configured to implement a pulse width modulation (PWM) technique to control the first intensity of the first radiation and the second intensity of second radiation generated by the one module with which the at least one processor is associated.

43. The apparatus of claim 41, wherein the at least one processor is configured as a uniquely addressable processor capable of receiving at least one control signal including lighting information representing the first intensity of the first radiation and the second intensity of second radiation generated by the one module with which the at least one processor is associated.

44. The apparatus of claim 43, wherein the at least one control signal includes address information and lighting information for the plurality of modules, wherein the lighting information represents intensity values for the first radiation and the second radiation generated by each module of the plurality of modules, and wherein the at least one processor
5 is configured to process the at least one control signal based on a unique address of the at least one processor and the address information in the at least one control signal to recover from the lighting information intensity values for the first radiation and the second radiation generated by the one module with which the at least one processor is associated.

10 45. The apparatus of claim 43, wherein each processor of the plurality of processors is configured as a uniquely addressable processor.

15 46. The apparatus of claim 45, wherein the plurality of processors are configured to be responsive to the at least one control signal so as to generate at least one time-varying lighting effect from the apparatus.

20 47. The apparatus of claim 45, wherein the plurality of processors are configured to be responsive to the at least one control signal so as to generate at least one time-varying variable color lighting effect from the apparatus.

48. The apparatus of claim 45, wherein the plurality of processors are configured to be responsive to the at least one control signal so as to generate sequential washes of different colors from the apparatus.

25 49. The apparatus of claim 45, wherein the plurality of processors are configured to be responsive to the at least one control signal so as to generate at least one time-varying variable color lighting effect from the apparatus that does not include any alphanumeric characters.

50. The apparatus of claim 45, wherein the plurality of processors are configured to be responsive to the at least one control signal so as to generate at least one time-varying variable color lighting effect from the apparatus that does not include any video images.

5 51. The apparatus of claim 45, wherein the plurality of processors are configured to be responsive to the at least one control signal so as to generate at least one time-varying variable color lighting effect from the apparatus that does not include any alphanumeric characters or video images.

10 52. The apparatus of claim 45, wherein the apparatus is configured as an architectural lighting panel.

53. The apparatus of claim 52, wherein the apparatus is configured to form at least a portion of an interior or exterior architectural surface.

15 54. The apparatus of claim 52, wherein the apparatus is configured as at least one of a wall panel, a floor panel, and a ceiling panel.

20 55. The apparatus of claim 52, in combination with at least one other geometric panel lighting apparatus according to claim 45 to form an architectural lighting panel system.

56. A building including the architectural lighting panel of claim 52, the building comprising a surface, wherein the architectural lighting panel is mounted on the surface.

25 57. The building of claim 56, wherein the surface comprises an outer surface of the building, and wherein the architectural lighting panel is mounted on the outer surface of the building.

58. The building of claim 57, wherein the architectural lighting panel is arranged on the outer surface of the building so as to attract the attention of an observer when at least one of the first radiation and the second radiation is generated.

5 59. An interior space including the architectural lighting panel of claim 52, wherein the architectural lighting panel is arranged so as to illuminate the interior space.

60. The interior space of claim 59, wherein the interior space includes at least one of a hallway, a ceiling, a floor, a wall, a door, and a display.

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61. A method of generating at least one variable color lighting effect over at least a two-dimensional observation area, comprising acts of:

A) generating from a plurality of LEDs at least first radiation having a first spectrum and second radiation having a second spectrum different than the first spectrum;

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B) at least partially diffusing the first radiation and the second radiation to provide a mixed spectrum, when both the first radiation and the second radiation are generated, via at least one geometric panel disposed with respect to the plurality of LEDs so as to receive the first radiation and the second radiation; and

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C) independently controlling at least a first intensity of the first radiation and a second intensity of the second radiation at a plurality of graduated intensities from a minimum intensity to a maximum intensity.

62. The method of claim 61, wherein the act C) includes an act of:

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independently controlling at least the first intensity of the first radiation and the second intensity of the second radiation so as to generate at least one time-varying variable color lighting effect.

63. The method of claim 61, wherein the act C) includes an act of:

independently controlling at least the first intensity of the first radiation and the second intensity of the second radiation so as to generate sequential washes of different colors.

- 5 64. The method of claim 61, wherein the act C) includes an act of:
 independently controlling at least the first intensity of the first radiation and the second intensity of the second radiation so as to generate at least one time-varying variable color lighting effect that does not include any alphanumeric characters.

- 10 65. The method of claim 61, wherein the act C) includes an act of:
 independently controlling at least the first intensity of the first radiation and the second intensity of the second radiation so as to generate at least one time-varying variable color lighting effect that does not include any video images.

- 15 66. The method of claim 61, wherein the act C) includes an act of:
 independently controlling at least the first intensity of the first radiation and the second intensity of the second radiation so as to generate at least one time-varying variable color lighting effect that does not include any alphanumeric characters or video images.

- 20 67. The method of claim 61, wherein the act C) includes an act of:
 independently controlling at least the first intensity of the first radiation and the second intensity of the second radiation in response to user operation of at least one user interface.

- 25 68. The method of claim 61, wherein the act C) includes an act of:
 implementing a pulse width modulation (PWM) technique to control at least the first intensity of the first radiation and the second intensity of the second radiation.

- 69. The method of claim 61, wherein the act C) includes an act of:

receiving at least one control signal including address information and lighting information.

70. The method of claim 69, wherein the at least one control signal includes address information and lighting information for a plurality of two-dimensional observation areas, wherein the lighting information includes intensity values for LEDs disposed in the plurality of two-dimensional observation areas, and wherein the act C) includes an act of:

processing the at least one control signal based on the address information in the at least one control signal to recover from the lighting information intensity values for the plurality of LEDs in a given two-dimensional observation area.

71. The method of claim 70, wherein the at least one control signal is formatted using a DMX protocol, and wherein the act C) includes an act of:

controlling the plurality of LEDs based at least in part on the DMX protocol.

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72. The method of claim 61, further comprising an act of:

D) coupling the at least one geometric panel to at least a portion of an interior or exterior architectural surface.

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73. The method of claim 72, wherein the act D) includes an act of:

coupling the at least one geometric panel to at least one of a wall, a floor, and a ceiling.

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74. The method of claim 72, further comprising an act of:

coupling the at least one geometric panel to at least one other geometric panel configured to at least partially diffuse other radiation generated by a second plurality of LEDs, so as to generate at least one variable color lighting effect over a plurality of two-dimensional observation areas.